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THE ACCESSORY FACTORS IN BACTERIAL GROWTH

V. THE VALUE OF THE SATELLITE (OR SYMBIOSIS) PHENOMENON FOR THE CLASSIFICATION OF HEMOPHILIC BACTERIA

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I have pointed out[1] that the satellitism of Pfeiffer's bacillus may be observed with many diverse micro-organisms. This suggests the possible value of this phenomenon for purposes of classification and identification of the hemophilic bacteria. Indeed, in my own work I have used this test for some time and I long since concluded that it was one of the most reliable and uniform criteria we have for this group.

The value depends on two facts: First, apparently all strains of the Pfeiffer type of hemophilic bacilli will reveal the satellite phenomenon when grown with another organism on blood plates. I have tested many hundreds of strains and have yet to find an exception. Second, the important point, which I have only recently observed, that Pfeiffer bacillus does not favorably influence itself. That is, if one prepares a blood plate seeded diffusely with Pfeiffer bacilli and then inoculates here and there with the same organism, after incubation one will observe no favorable influence on the colonies of the organisms last inoculated.

It seemed to me that in view of certain slight differences between strains of this group, cultural and otherwise, that possibly here was a method of further differentiation. Accordingly, using as central colonies various strains of Pfeiffer bacilli, blood plates were seeded with homologous and heterologous strains. Strains thus tested included 3 from the lungs of patients with epidemic influenza pneumonia, 1 from influenzal meningitis, 3 from excised adenoids and 1 from an infected frontal sinus; also 3 indol and 3 nonindol forming strains obtained from Dr. E. O. Jordan. In no instance, when such "cross" satellite tests were made, did there appear any favoring influence of one strain

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[1] Jour. Infect. Dis., 1921, 29, p. 178.

on another, though all were influenced favorably by staphylococci and other bacteria. Various strains were mixed on the same medium and cultivated together to find whether the growth was enhanced to any degree. The results were negative. It would appear, then, that the differences that have been noted by agglutination, cultural reactions and virulence tests between strains of Pfeiffer bacilli cannot be detected by this test.

However, for differentiating from closely related groups, the test becomes of real value. This applies especially to the organisms that grow well on blood and now commonly classed as hemophilous. The Committee on Classification of the Society of American Bacteriologists has recently placed provisionally in the genus Hemophilus, the Pfeiffer bacillus, B. pertussis (Bordet), the Morax-Axenfeld bacillus, B. ducreyi and the Koch-Weeks bacillus. Strains of all these organisms were subjected by me to this test of satellitism. They were used as central colonies on plates seeded with Pfeiffer's bacilli and about all, a favorable influence on the Pfeiffer bacilli was noted. Three strains of B. pertussis, one of Morax-Axenfeld and one of B. ducreyi were used. On the other hand, none of the bacilli just mentioned is favorably influenced by other bacteria. It appears then that here is a definite and sharp method of differentiating the Pfeiffer group of bacilli from other hemophiles.

It should be stated that apparently none of the latter organisms is strictly speaking hemophilic as is the Pfeiffer bacillus. While they grow better on blood or hemoglobin medium, they can all be cultivated on special mediums without blood. Another difference between the Pfeiffer bacillus and the other bacteria mentioned is that the former grow and indeed grow better on medium containing small even minute quantities of hemoglobin, whereas the latter require large amounts of blood or tissue fluids.

Several strains of bacilli from the conjunctiva, which, I think, commonly would be called Koch-Weeks bacilli, were tested and none revealed satellitism with Pfeiffer bacilli. On the other hand, they were favorably influenced by other organisms (staphylococcus and streptococcus) exactly as are typical Pfeiffer's bacilli. I am therefore inclined to the view that they all are strains belonging to the Pfeiffer group. This test would not exclude, of course, the possibility of their being differentiated from other strains by finer methods.

SUMMARY

The satellite phenomenon is of value in identifying and in classifying members of the hemophilic group. Its value depends on the fact that Pfeiffer's bacillus is not favorably influenced in its growth by homologous or heterologous strains, while apparently all other strains of hemophilic organism reveal this phenomenon.